

SERVICE
MANUAL
FOR

FLEXIFLO-II[®] **PORTABLE** **ENTERAL** **NUTRITION** **PUMP**



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SECTION

1

PARTS LIST AND EXPLODED
VIEW OF PUMP (FIGURE 1)

Item No.	Description	Quantity in Pump	Part No.
1.	Front Housing	1	321-01-001
2.	Motor Clamp Ring	1	321-01-002
3.	Clear Window	1	321-01-004
4.	Speed Control Knob	1	321-01-005
5.	Tube Holder	1	321-01-006
6.	Printed Circuit Board	1	321-07-000
7.	Rotor Head	1	321-06-000
8.	Motor/Gearbox Assembly	1	321-09-000
9.	Photo Transistor	2	321-99-001
10.	Emitter	2	321-99-002
11.	Switch	1	321-99-003
12.	Button	1	321-99-004
13.	Chassis Plate	1	321-99-005
14.	"P" Clip	1	321-99-006
15.	Rear Housing	1	321-02-001
16.	Printed Circuit Board	1	321-08-000
17. (A&B)	12V AC Input Receptacle & Nut	1	321-99-007
18. (A&B)	Fuse Holder & Nut	2	321-99-008
19.	Fuse Carrier	2	321-99-009
20.	DC Fuse 500 mA, Quick-Acting	1	321-99-010
21.	AC Fuse 500 mA, Time-Delay	1	321-99-011
22.	Fuse Label	1	321-99-012
23.	Serial Number Label	1	321-99-013
24.	Model Label	1	321-99-014
25.	Retaining Plate	1	321-03-001

PARTS LIST

Item No.	Description	Quantity in Pump	Part No.
26.	Battery Strap	1	321-03-002
27.	Battery—6 Volt	1	321-99-015
28.	Rubber Feet	4	321-99-016
29.	Bottle Holder	1	321-04-001
30.	Stiffening Plate Assembly	1	321-04-003
31.	Strap Assembly	1	321-99-017
32.	Clamp Assembly	1	321-05-000
33.	Clamp Plate	1	321-10-001
34.	Spring Holder	1	321-10-002
35.	Spring	1	321-99-018
36.	Neoprene Gasket	1	321-99-019
37.	Power Supply	1	321-99-020
38.	"D" Clip	1	321-99-021
39.	Screw M3x8Lg Phillips Pan Hd. Stl.	11	321-99-022
40.	Screw M3x10Lg Phillips Pan Hd. Stl.	3	321-99-023
41.	Screw M3x25Lg Phillips Pan Hd. Stl.	4	321-99-024
42.	Screw M4x10Lg Phillips C'sk Hd. Stl.	4	321-99-025
43.	Screw No. 2x6 Lg Phillips Pan Hd. Stl.	4	321-99-026
44.	Screw No. 4x1/4" Type B (4261) Pan Hd. Stl.	2	321-99-027
45.	Screw No. 0x1/4" Hammer Drive Phillips Pan Hd. Stl.	2	321-99-028
46.	Washer M3. Crinkle Beryl. Copper	22	321-99-029
47.	Socket	1	321-99-030
48.	Cable Harness No. 1 (AC Fuse)	1	321-99-031
49.	Cable Harness No. 2 (AC Input)	1	321-99-032
50.	Cable Harness No. 3 (Battery)	1	321-99-033
51.	Cable Harness No. 4 (DC Fuse)	1	321-99-034
52.	Cable Harness No. 5 (Switch)	1	321-99-035
53.	Cable Harness No. 6 (14 Pin)	1	321-99-036
54.	Cable Harness No. 7 (Opto System)	1	321-99-037
55.	Cable Harness No. 8 (Motor)	1	321-99-038

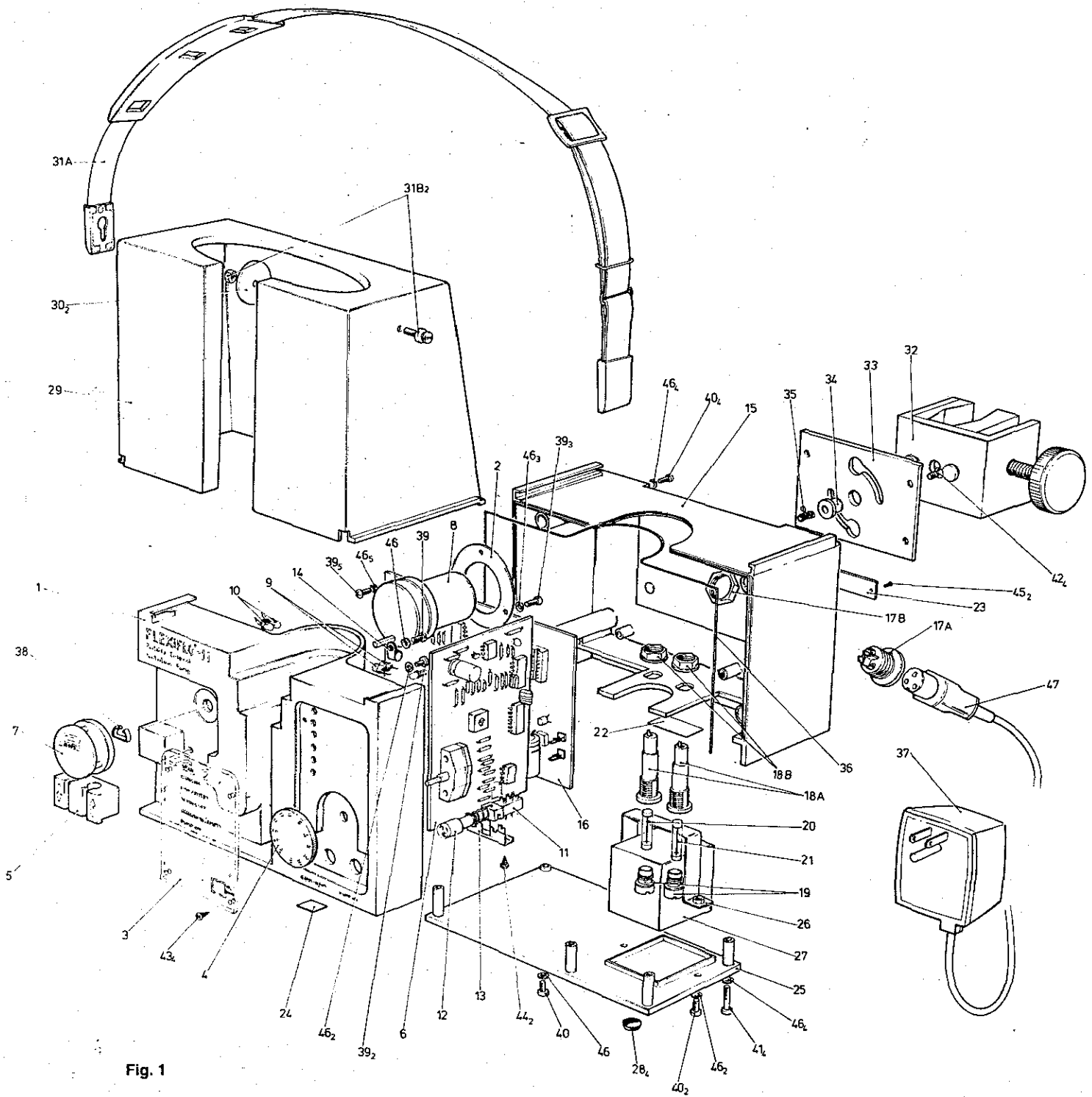


Fig. 1

SECTION 2 OPENING THE PUMP

Turn pump off and disconnect electrical outlet.

STEP 1

Refer to Figure 2. Stand the pump on a table with the back facing you. Remove four screws (item 424) to remove the clamp plate (item 33). The spring holder and spring (items 34, 35) are held in place by the clamp plate (item 33). Do not lose these two items when removing the clamp plate.

STEP 2

Remove the bottle holder (item 29) by applying pressure from the front of the pump and sliding it toward the back of the pump, as indicated by the two arrows.

STEP 3

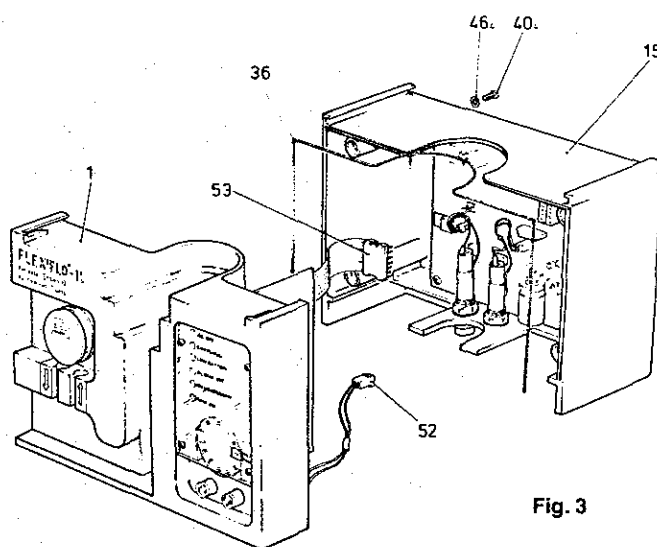
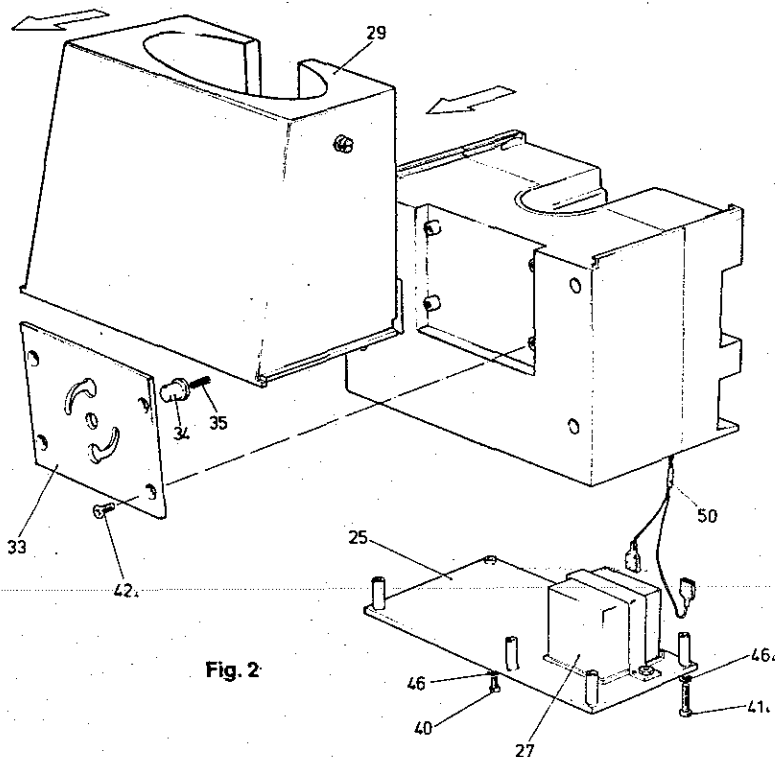
Turn the main assembly over so that the base is facing up. Remove five screws (items 414, 40). Take care not to lose the five spring washers (items 46 and 464). Remove the battery (item 27) and the base retaining plate (item 25) from the case.

STEP 4

Disconnect cable harness 3 (item 50) from the battery (item 27).

STEP 5

Refer to Figure 3. Place the pump face down. Remove four screws (item 404). Take care not to lose the four spring washers (item 464). Part the two halves of the case, leaving the neoprene gasket (item 36) in position. Disconnect cable harness 5 (item 52) from cable harness 6 (item 53).



DISASSEMBLY

STEP 1

Follow Section 2, steps 1-5, page 6.

STEP 2

Refer to Figure 4. Remove the clear window (item 3) by removing four screws (item 43₄).

STEP 3

Pull out the speed control knob (item 4).

STEP 4

Remove the tube holder (item 5) by removing two screws (item 39₂). Do not lose the spring washers (item 46₂).

STEP 5

Remove the rotor head (item 7) by pulling it away from the drive shaft of the gearbox (item 8) in the direction of the arrow.

STEP 6

Remove the pump on/off switch (items 11, 12) and the chassis plate (item 13) by removing two screws (item 44₂).

STEP 7

Disconnect cable harness 7 (item 54) from plug PL7 on the printed circuit board (item 6). NOTE: Plug numbers are marked directly on the printed circuit board.

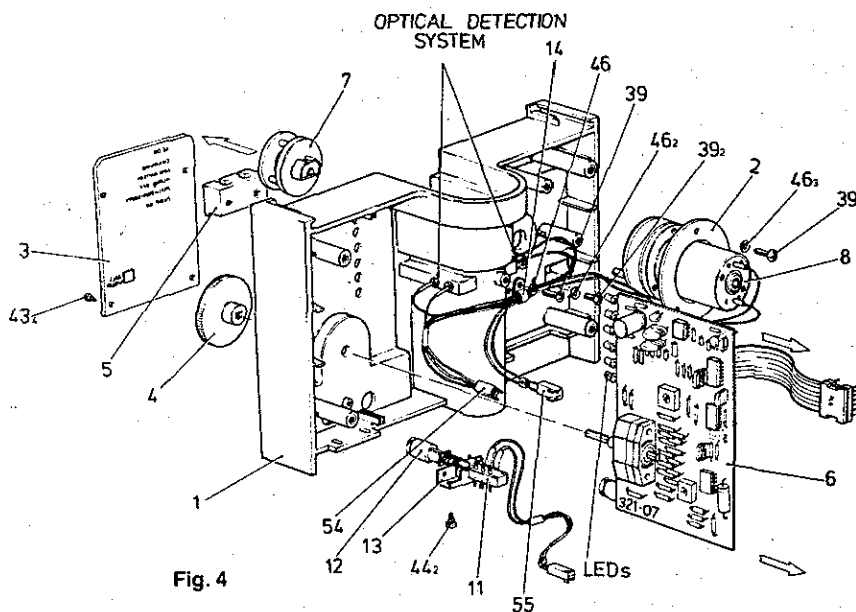


Fig. 4

STEP 8

Disconnect the motor/gearbox assembly (item 8) by removing cable harness 8 (item 55) from plug PL8 on the printed circuit board (item 6).

STEP 9

Slide the printed circuit board (item 6) out of location grooves in the direction of the arrows. **CAUTION:** Do not damage the LEDs on the front of the printed circuit board.

STEP 10

Remove screw (item 39) and spring washer (item 46) to release the "P" clip (item 41).

STEP 11

Remove the three screws (item 39₃) and three spring washers (item 46₃) securing the motor clamp ring (item 2). Withdraw the motor/gearbox assembly (item 8) from the case. **NOTE:** An optical detection system is attached to the inside of the front housing (item 1). Do not remove this system from the housing. A new optical detection system is supplied with the replacement front housing.

REASSEMBLY

STEP 1

Refer to Figure 5. Locate the motor/gearbox assembly (item 8) through the hole in the front housing (item 1). Ensure that the front bearing of the gearbox passes through the hole in the front housing.

STEP 2

Attach the motor clamp ring (item 2) to the three pillars around the periphery of the gearbox with three screws (item 39₃) and three spring washers (item 46₃). **CAUTION:** Be sure that the motor clamp ring is not distorted by overtightening of the screws. Overtightening of this ring increases the current consumption of the motor. Torque should not exceed $\frac{3}{4}$ pound-inches. Refer to Section 11—Checking the Motor Current, page 19.

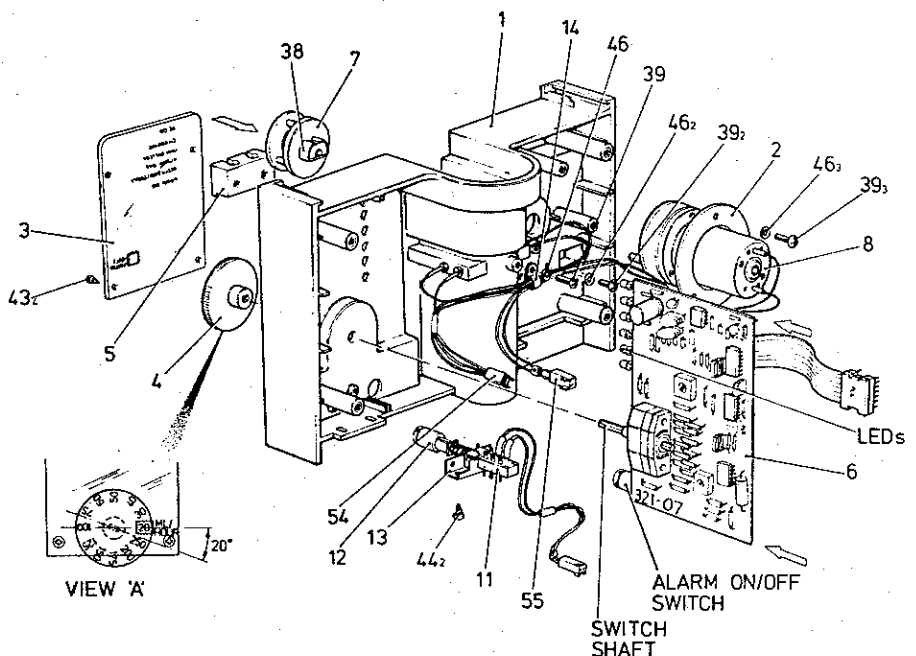


Fig. 5

STEP 3

Place cable harness 8 (item 55) through the "P" clip (item 14) together with cable harness 7 (item 54). Secure the "P" clip (item 14) to the front housing with a screw (item 39) and spring washer (item 46).

STEP 4

Position the tube holder (item 5) in the slot below the gearbox drive shaft on the front face of the front housing (item 1). Secure it from the inside of the case with two screws (item 39₂) and two spring washers (item 46₂).

STEP 5

Align the "D" spring clip (item 38) of the rotor head (item 7) to the D-shaped drive shaft of the gearbox (item 8). Push it on. Be sure that the rotor head is pushed on all the way, leaving a gap of approximately $\frac{1}{8}$ " between the rear of the rotor head and the front face of the front housing.

STEP 6

Replace the pump on/off switch (items 11, 12, 13) by passing the black button of the switch through the hole in the front housing. Secure the chassis plate (item 13) to the case with two screws (item 44₂).

STEP 7

Slide the printed circuit board (item 6) into location grooves provided on the inside of the front housing. The six LEDs on the front edge of the printed circuit board should pass through the six holes in the front housing and the switch shaft and alarm on/off switch should also pass through the holes in the front housing.

STEP 8

Place the speed control knob (item 4) over the "double D" profile of the switch shaft. The speed control knob should be aligned as indicated in View 'A' (Figure 5) when the switch shaft is turned fully counterclockwise.

STEP 9

Replace the clear window (item 3) in the recessed area over the LEDs and the speed control knob (item 4) using four screws (item 43₄).

STEP 10

Connect cable harness 7 (item 54) to plug PL7 on the printed circuit board (item 6). NOTE: Plug numbers are marked directly on the printed circuit board.

STEP 11

Connect cable harness 8 (item 55) to plug PL8 on the printed circuit board (item 6).

STEP 12

Follow reassembly procedure—Section 12, page 20.

SECTION

4

REPLACING THE REAR HOUSING (ITEM 15)

DISASSEMBLY

STEP 1

Follow Section 2, steps 1-5, page 6.

STEP 2

Refer to Figure 6. Disconnect the cable harnesses 1, 2, and 4 (items 48, 49, 51) from plugs PL1, PL2, and PL4 on the printed circuit board (item 16). NOTE: Plug numbers are marked directly on the printed circuit board.

STEP 3

Remove the AC and DC fuse holders (item 18A) by removing the two large nuts (item 18B), securing them to the rear housing. Withdraw fuse holders and cable harnesses 1 and 4 (items 48, 51) from the holes.

STEP 4

Remove five screws (item 39s). Do not lose spring washers (item 46s).

STEP 5

Remove printed circuit board (item 16).

STEP 6

Remove the 12V AC input receptacle (item 17A) by removing the large nut (item 17B) on the inside of the rear housing. Withdraw the receptacle and cable harness 2 (item 49) through the hole.

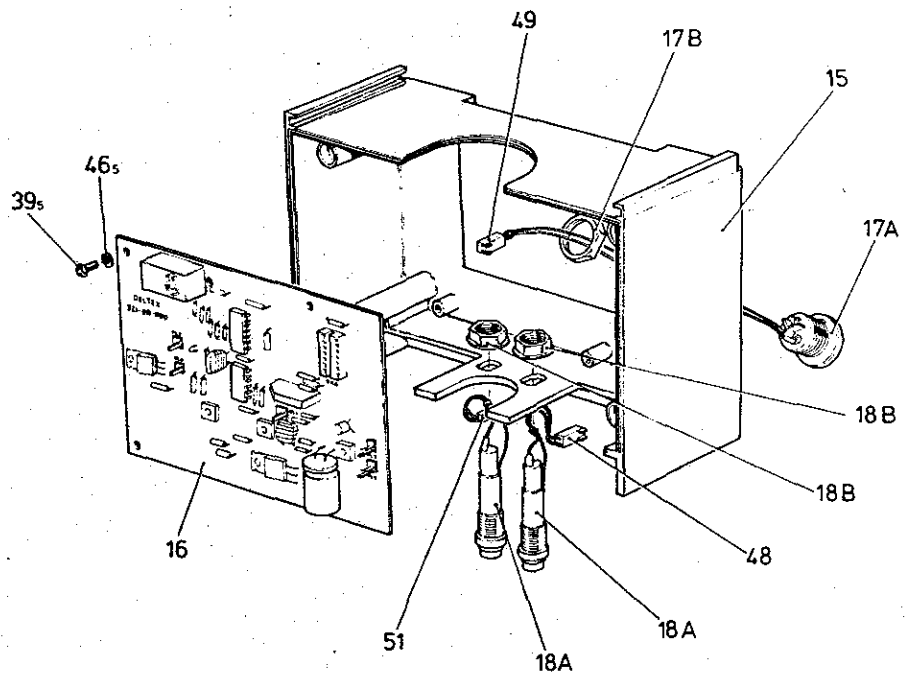


Fig. 6

REASSEMBLY

STEP 1

Refer to Figure 6. Replace the 12V AC input receptacle (item 17A) by feeding cable harness 2 (item 49) through the hole in the rear housing. Secure the receptacle with the large nut (item 17B) on the inside of the case.

STEP 2

Place the printed circuit board (item 16) in position over the five mounting pillars and secure by replacing the five screws (item 39_s) and five spring washers (item 46_s).

STEP 3

Replace the two fuse holders (item 18A) by feeding cable harnesses 1 and 4 (items 48, 51) through the holes in the rear housing. Secure the fuse holders with the two large nuts (item 18B) on the inside. The fuse with cable harness 4 (item 51) should be placed in the *lefthand hole* when looking into the rear housing directly onto the printed circuit board.

STEP 4

Connect cable harness 1 (item 48) to plug PL1, cable harness 2 (item 49) to plug PL2, and cable harness 4 (item 51) to plug PL4 on the printed circuit board (item 16).

NOTE: Plug numbers are marked directly on the printed circuit board.

STEP 5

Follow reassembly procedure—Section 12, page 20.

SECTION 5

REPLACING THE BOTTLE HOLDER (ITEM 29)

DISASSEMBLY

Follow Section 2, steps 1 and 2, page 6.

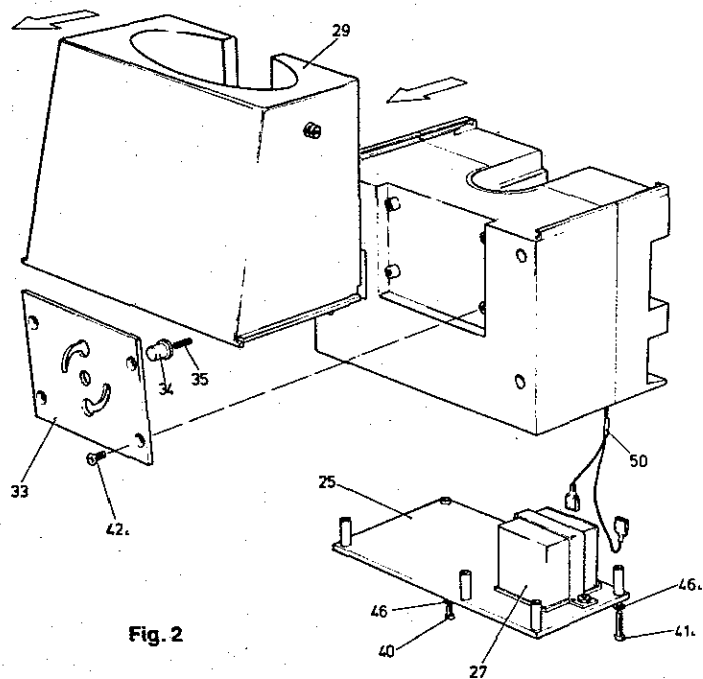


Fig. 2

REASSEMBLY

Follow Section 12, steps 10-13, page 21.

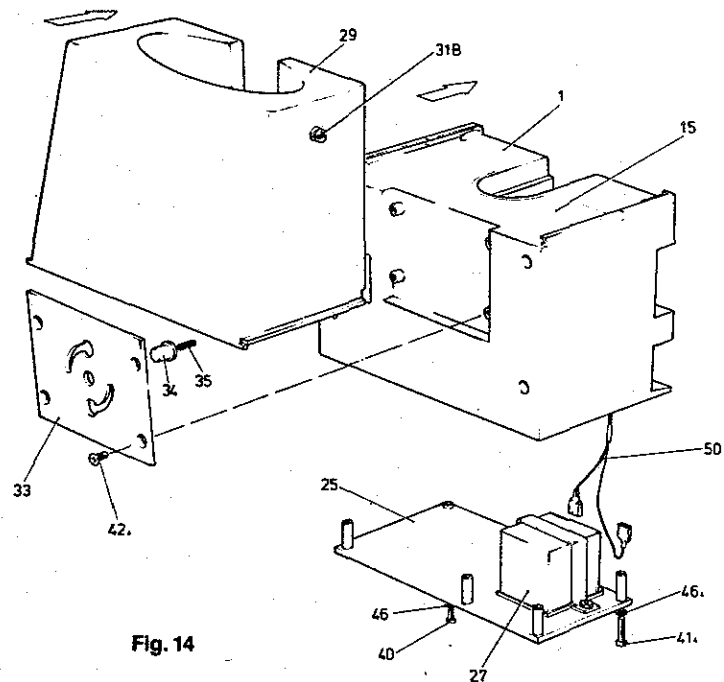


Fig. 14

DISASSEMBLY**STEP 1**

Follow Section 2, steps 1-5, page 6.

STEP 2

Refer to Figure 7. Remove the rotor head (item 7) by pulling it in the direction of the arrow.

STEP 3

Disconnect the motor/gearbox assembly (item 8) by removing cable harness 8 (item 55), from the printed circuit board (item 6).

STEP 4

Remove the screw (item 39) and spring washer (item 46₁) to release the "P" clip (item 14).

STEP 5

Remove the three screws (item 39₃) and three spring washers (item 46₃) securing the motor clamp ring (item 2). Withdraw the motor/gearbox assembly (item 8) from the front housing.

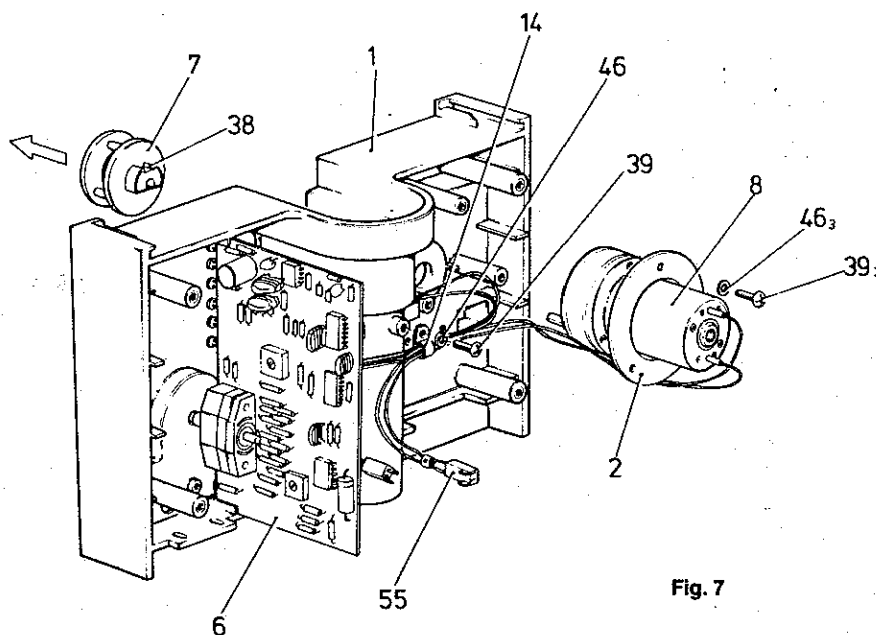


Fig. 7

REASSEMBLY

STEP 1

Refer to Figure 7. Locate the motor/gearbox assembly (item 8) through the hole in front housing (item 1). Ensure that the front bearing of the gearbox passes through the hole in the front housing.

STEP 2

Attach the motor clamp ring (item 2) to the three pillars of the front housing with three screws (item 39₃) and three spring washers (item 46₃). **CAUTION:** The motor clamp ring must not be distorted by overtightening of the screws. Overtightening of this ring increases the current consumption of the motor. Torque should not exceed $\frac{3}{4}$ pound-inches. Refer to Section 11—Checking the Motor Current, page 19.

STEP 3

Place cable harness 8 (item 55) through the "P" clip (item 14) together with cable harness 7 (item 54). Secure the "P" clip with the screw (item 39) and spring washer (item 46).

STEP 4

Connect cable harness 8 (item 55) to plug PL8 on printed circuit board (item 6). **NOTE:** Plug numbers are marked directly on the printed circuit board.

STEP 5

Align the "D" spring clip (item 38) of the rotor head (item 7) to the D-shaped drive shaft of the gearbox (item 8). Push it on. The rotor head should be pushed on all the way, leaving a gap of approximately $\frac{1}{8}$ " between the rear of the rotor head and the front face of the front housing.

STEP 6

Follow reassembly procedure—Section 12, page 20.

SECTION 7

REPLACING THE COMPONENTS IN THE REAR HOUSING (ITEMS 17, 18)

DISASSEMBLY

STEP 1

Follow Section 2, steps 1-5, page 6.

STEP 2

Refer to Figure 8. Disconnect cable harnesses 1, 2, and 4 (items 48, 49, 51) from the printed circuit board (item 16).

STEP 3

Unscrew the three large nuts (items 17B, 18B) on the inside of the rear housing. Carefully withdraw cable harnesses 1, 2, and 4 (items 48, 49, 51) from the holes in the rear housing. Remove the two fuse holders (item 18A) and the 12V AC input receptacle (item 17A).

REASSEMBLY

STEP 1

Refer to Figure 8. Insert the two fuse holders (item 18A) and the 12V AC input receptacle (item 17A) by feeding cable harnesses 1, 2, and 4 (items 48, 49, 51) through the appropriate holes. Secure the fuse holders and receptacle with three large nuts (items 17B, 18B).

STEP 2

Reconnect cable harnesses 1, 2, and 4 (items 48, 49, 51) to plugs PL1, PL2, and PL4 on the printed circuit board (item 16). NOTE: Plug numbers are marked directly on the printed circuit board.

STEP 3

Follow reassembly procedure—Section 12, page 20.

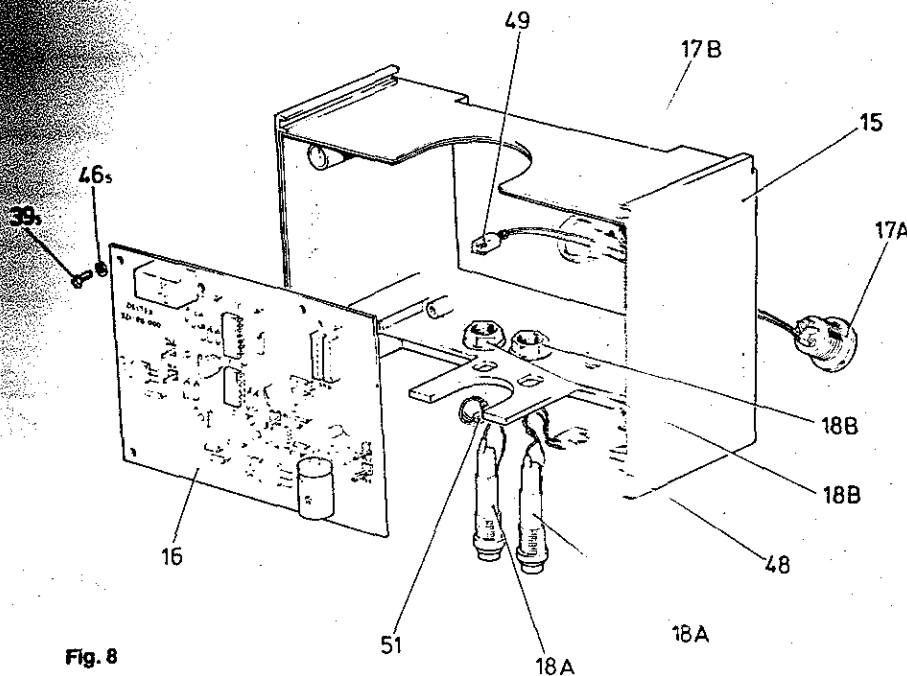


Fig. 8

SECTION

8

REPLACING THE PUMP ON/OFF SWITCH (ITEMS 11-13)

DISASSEMBLY

STEP 1

Follow Section 2, steps 1-5, page 6.

STEP 2

Refer to Figure 9. Remove the pump on/off switch (items 11, 12) and mounting bracket (item 13) by removing two screws (item 44₂).

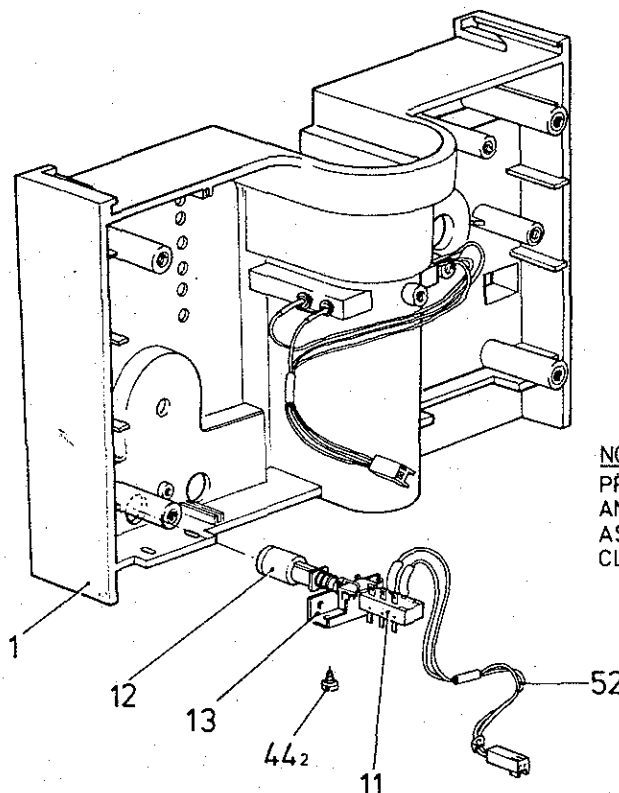
REASSEMBLY

STEP 1

Refer to Figure 9. Replace the pump on/off switch (items 11, 12) by passing the black button of the switch through the hole in the front housing (item 1). Secure the mounting bracket (item 13) with two screws (item 44₂).

STEP 2

Follow reassembly procedure—
Section 12, page 20.



NOTE:
PRINTED CIRCUIT BOARD
AND MOTOR/GEARBOX
ASSEMBLY OMITTED FOR
CLARITY.

Fig. 9

DISASSEMBLY**STEP 1**

Follow Section 2, steps 3 and 4, page 6.

STEP 2

Refer to Figure 10. Remove the battery strap (item 26) by removing two screws (item 40₂) and two spring washers (item 46₂). Lift the battery (item 27) from the recess in the retaining plate (item 25).

STEP 3

Disconnect cable harness 3 (item 50) from the battery.

REASSEMBLY**STEP 1**

Refer to Figure 10. Place the battery in the recess in the retaining plate (item 25). Locate the positive and negative battery terminals as shown.

STEP 2

Replace the battery strap (item 26) and secure it, using two screws (item 40₂) and two spring washers (item 46₂).

STEP 3

Connect cable harness 3 (item 50) to battery as indicated. RED LEAD TO POSITIVE TERMINAL. BLACK LEAD TO NEGATIVE TERMINAL.

STEP 4

Follow reassembly procedure—Section 12, page 20.

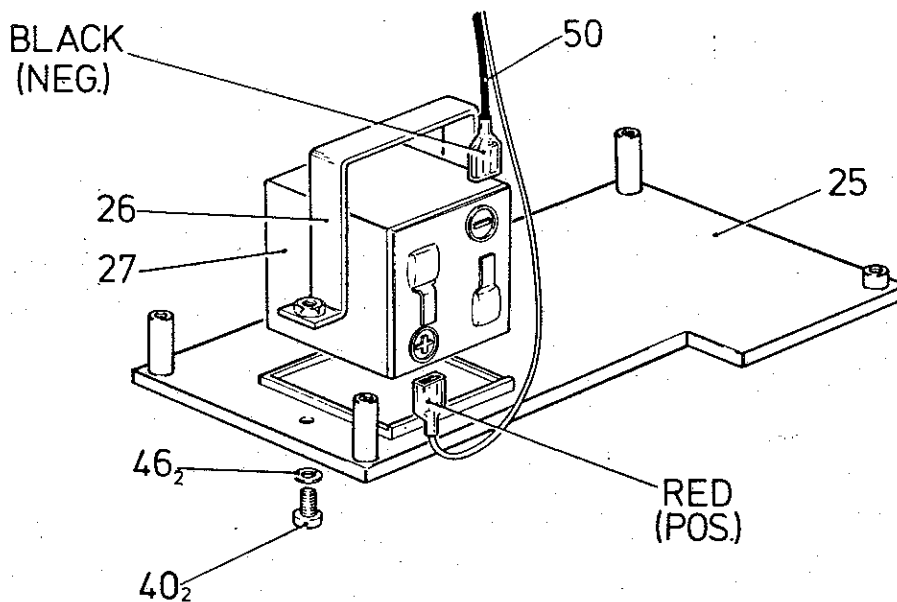


Fig. 10

SECTION

10

REPLACING THE FUSES (ITEMS 20, 21)

DISASSEMBLY

STEP 1

Follow Section 2, step 3, page 6.

STEP 2

Refer to Figure 11. Remove the relevant fuse carrier (item 19) from the fuse holder (item 18A) to provide access to the fuse (item 20 or 21).

REASSEMBLY

STEP 1

Refer to Figure 11.

CAUTION: The DC fuse (item 20) should be replaced with only a 500 mA quick-acting fuse and the AC fuse (item 21) with only a 500 mA time-delay fuse.

STEP 2

Replace the fuse carrier (item 19) into the fuse holder (item 18A).

STEP 3

Replacement of retaining plate—
Follow Section 12, step 9, page 21.

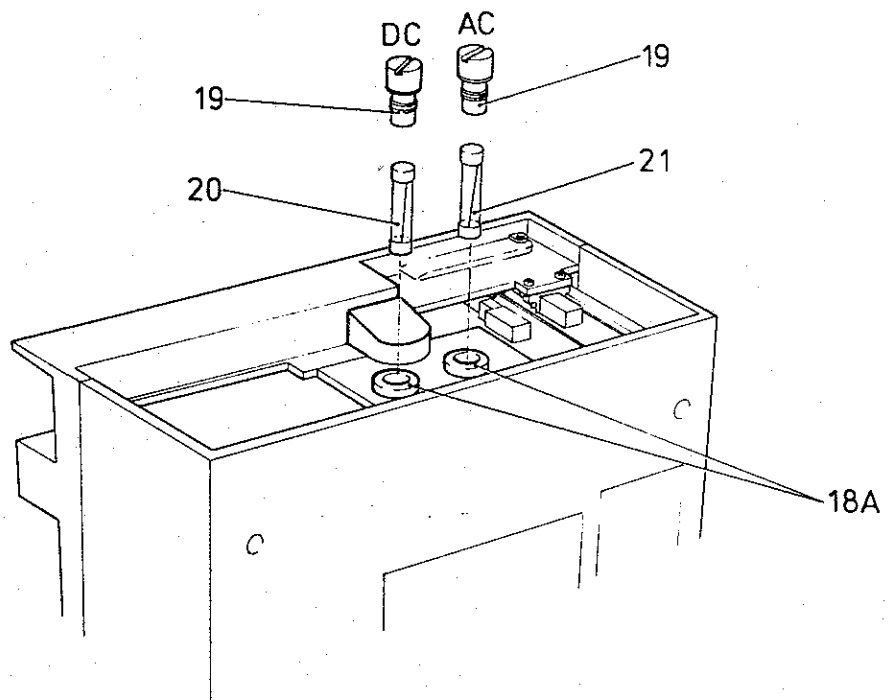


Fig. 11

STEP 1

Follow Section 2, steps 1-5, page 6.

STEP 2

Refer to Figure 12. Check that the motor current is below 20 mA by measuring the voltage across resistor R27 on the printed circuit board (item 6) (4.7 ohms). The voltage across R27 should be 94 mV maximum.

STEP 3

If the voltage across R27 is greater than 94 mV, check that the motor/gearbox assembly (item 8) is correctly positioned in the front housing (item 1) and that the motor clamp ring (item 2) is not fixed too tight to the front housing by the three screws (item 39₃).

STEP 4

Follow reassembly procedure—Section 12, page 20.

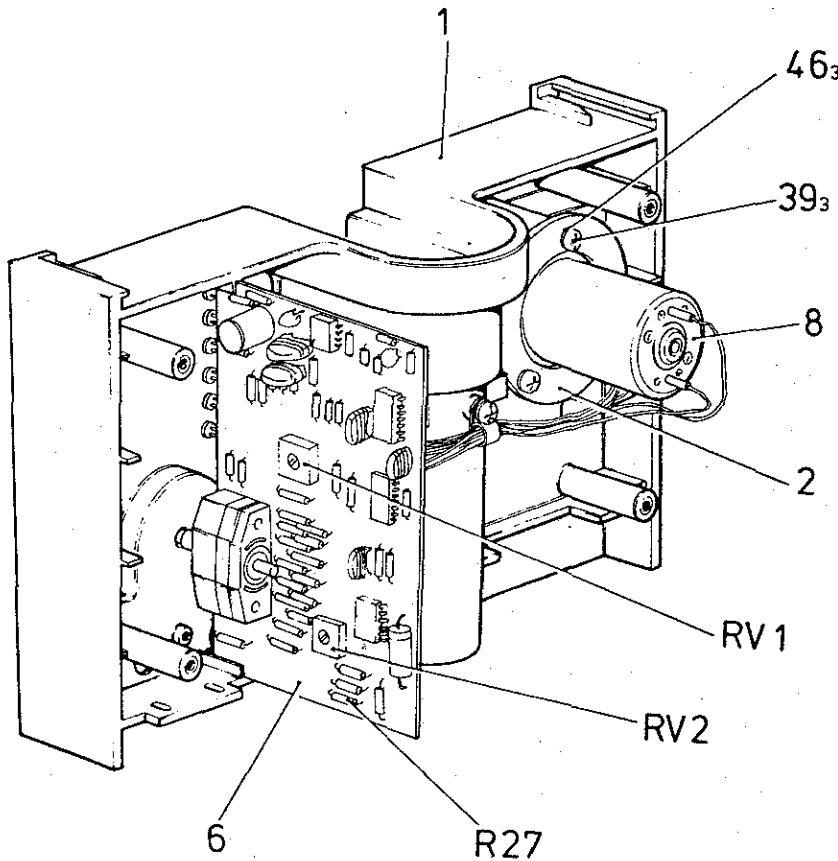


Fig. 12

SECTION

12

REASSEMBLING THE PUMP

STEP 1

Refer to Figure 13. The neoprene gasket (item 36) should be positioned correctly in the slot around the inside edge of the rear housing (item 15).

STEP 2

Place the rear housing (item 15) on a flat surface with the inside facing upward.

STEP 3

Position the front housing (item 1) over the rear housing (item 15) and connect cable harness 6 (item 53) to the 14-pin dual in-line (SK6) socket on the printed circuit board (item 16). Take care to align the 14 pins correctly and ensure that the cable leaves the socket on the left-hand side.

STEP 4

Connect cable harness 5 (item 52) to plug PL5 on the printed circuit board (item 16). NOTE: Plug numbers are marked directly on the printed circuit board.

STEP 5

Bring the two halves of the pump together. Take care not to trap any of the cable harnesses. Secure the halves together with four screws (item 40₄) and four spring washers (item 46₄).

STEP 6

Cable harness 3 (item 50) should pass through the battery aperture.

STEP 7

Refer to Figure 14. Turn the sub-assembly over so that the base is facing up.

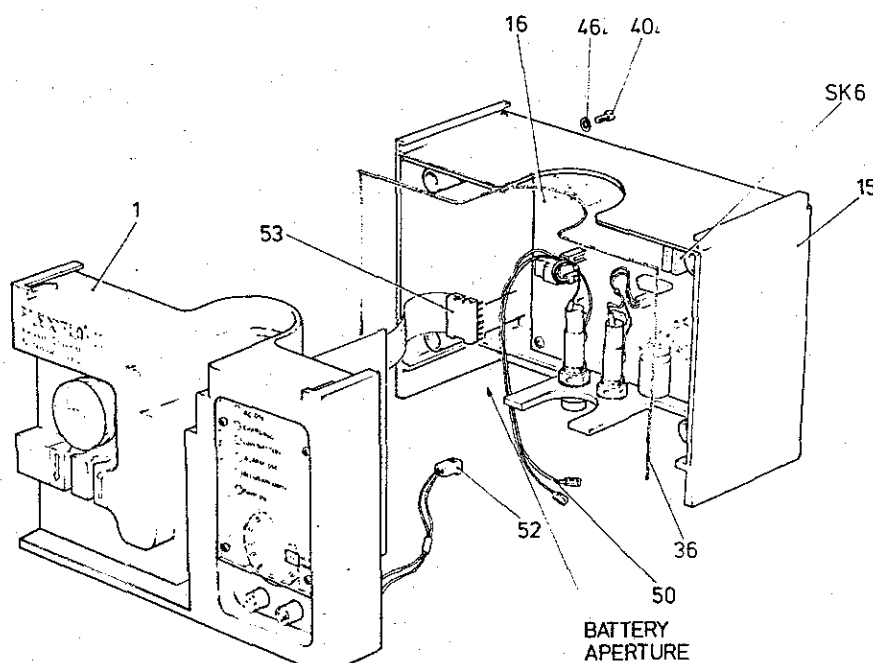


Fig. 13

STEP 8

Connect cable harness 3 (item 50) to the battery (item 27) ensuring that the **RED LEAD GOES TO POSITIVE TERMINAL AND THE BLACK LEAD TO NEGATIVE TERMINAL**. Refer to Section 9, Figure 10, page 17.

STEP 9

Place the retaining plate (item 25) together with the connected battery into the base of the pump, taking care not to trap cable harness 3 (item 50). Secure the plate into position with five screws (items 40, 41) and five spring washers (item 46).

STEP 10

Turn the subassembly over to stand on its four rubber feet. With the rear toward you, slide the bottle holder (item 29) into the grooves on the top of the subassembly of items 1 and 15, pushing it all the way forward.

STEP 11

Place the spring (item 35) into the spring holder (item 34) and place them through the hole in the center of the clamp plate (item 33).

STEP 12

Place the clamp plate (item 33) over the four pillars on the rear of the subassembly (item 15), with the spring holder (item 34) protruding through the hole in the plate and the spring (item 35) toward the rear housing.

NOTE: The countersunk holes in the plate should be facing away from the rear housing.

STEP 13

Secure the clamp plate (item 33) with four countersunk screws (item 42).

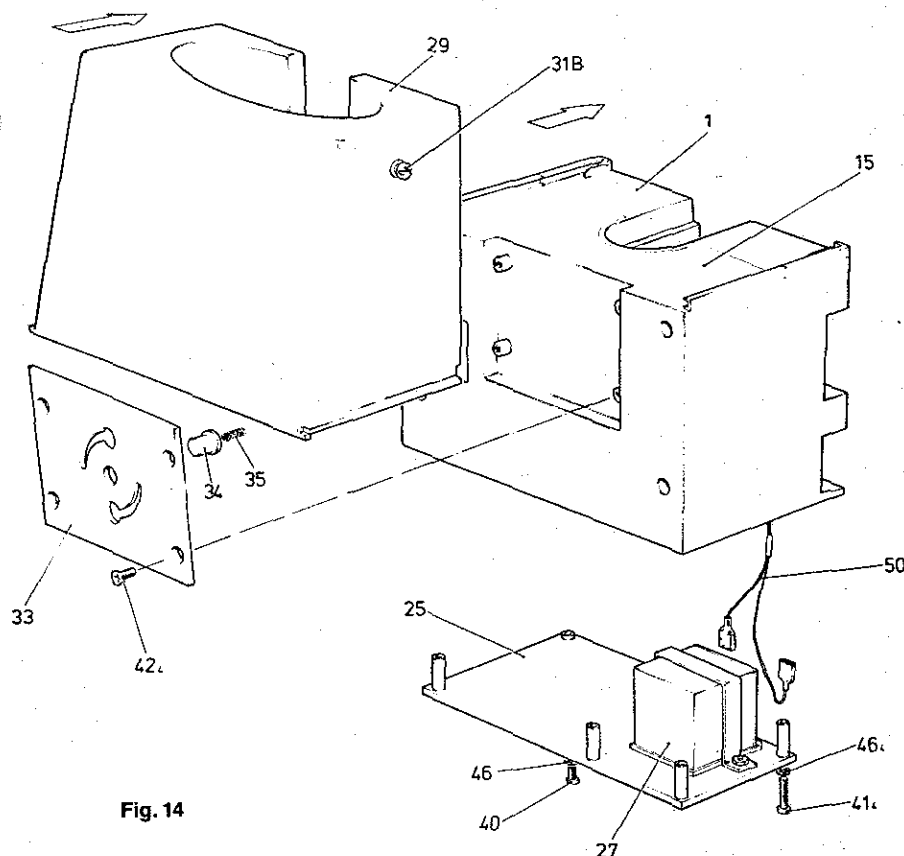


Fig. 14

STEP 1

With a feeding set pump insert fitted correctly over the rotor head, switch the pump on and set the speed control knob to 20 mL/hour.

STEP 2

Check the rotor head speed with a stopwatch. The speed should be one revolution of the rotor head in 50 seconds $\pm$ 2 seconds. Adjust RV2 for corrections. (Refer to Figure 12, page 19.)

STEP 3

Set the speed control knob to 250 mL/hour.

STEP 4

Check the rotor head speed with a stopwatch. The speed should be one revolution of the rotor head in 4 seconds $\pm$ 0.1 seconds. Adjust RV1 for corrections. (Refer to Figure 12, page 19.)

